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## Sertifikaat

IB99/1576  
REPUBLIEK VAN SUID-AFRIKA

REPUBLIC OF SOUTH AFRICA

PATENTKANTOOR

DEPARTEMENT VAN HANDEL  
EN NYWERHEID15. 11. 99  
Certificate

PATENT OFFICE

09/806800

DEPARTMENT OF TRADE  
AND INDUSTRY

REC'D 17 NOV 1999

WIPO PCT

Hiermee word gesertifiseer dat  
This is to certify that

the documents annexed hereto are true copies of:

Application forms P.1 and P.3, provisional specification and drawings of South African Patent Application No. 98/9244 as originally filed in the Republic of South Africa on 9 October 1998 in the name of ANGLO AMERICAN INDUSTRIAL CORPORATION LIMITED for an invention entitled: "A WINDSCREEN WIPER";

AND it is further certified that Patent Application No. 98/9244 and the invention forming the subject matter of the patent application, together with all priority rights flowing from the patent application under the provisions of the International Convention were duly assigned in accordance with law from ANGLO AMERICAN INDUSTRIAL CORPORATION LIMITED to TRICO PRODUCTS CORPORATION by virtue of Deed of Assignment effective from 14 November 1998 which Deed of Assignment was duly registered at the Patent Office, Pretoria, on 19 May 1999.

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d at PRETORIAin die Republiek van Suid-Afrika, hierdie  
in the Republic of South Africa, this1st dag van  
day of

November 1999

PRIORITY  
DOCUMENTSUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH RULE 17.1(a) OR (b)

  
Registateur van Patente  
Registrar of Patents

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978  
APPLICATION FOR A PATENT AND  
ACKNOWLEDGEMENT OF RECEIPT  
(Section 30(1) Regulation 22)

FORM P REVENUE  
(to be lodged in duplicate)

-9.10.98

R 060.00

THE GRANT OF A PATENT IS HEREBY REQUESTED BY THE UNDERMENTIONED APPLICANT ON THE BASIS OF THE PRESENT APPLICATION FILED IN DUPLICATE

INKOMSTE

REPUBLIC VAN SUID AFRIKA

HASR

370

A & A REF: V13050 AL

PATENT APPLICATION NO.	
21	01
989244	
71	FULL NAMES(S) OF APPLICANT(S)

ANGLO-AMERICAN INDUSTRIAL CORPORATION LIMITED

App. Sub. Trico Products Corp.  
19.5.99

ADDRESS(ES) OF APPLICANT(S)

44 Main Street, Johannesburg,  
Gauteng, Republic of South Africa.

54 TITLE OF INVENTION

"A WINDSCREEN WIPER"

- ☐ Only the items marked with an "X" in the blocks below are applicable.
- ☐ THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. The earliest priority claimed is Country: No: Date:
- ☐ THE APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO. |21|01|
- ☐ THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO. |21|01|

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ A single copy of a provisional specification of 7 pages.
- ☒ Drawings of 3 sheets.
- ☐ Publication particulars and abstract (Form P.8 in duplicate) (for complete only).
- ☐ A copy of Figure of the drawings (if any) for the abstract (for complete only).
- ☒ An assignment of invention.
- ☐ Certified priority document(s) (State quantity): .....
- ☐ Translation of the priority document(s).
- ☐ An assignment of priority rights.
- ☐ A copy of Form P.2 and the specification of RSA Patent Application No. |21|01|
- ☒ A Form P.2 in duplicate.
- ☒ A declaration and power of attorney on Form P.3.
- ☐ Request for ante-dating on Form P.4.
- ☐ Request for classification on Form P.9.
- ☐ Request for delay of acceptance on Form P.4.
- ☒ A copy of Form P.1

74 ADDRESS FOR SERVICE: Adams & Adams, Pretoria

DATED THIS 9TH DAY OF OCTOBER

1998

A LEWIS

ADAMS & ADAMS

APPLICANTS' PATENT ATTORNEYS

The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp.

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1998-10-09
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EN OUTERS

## DECLARATION AND POWER OF ATTORNEY

(Section 30 - Regulation 8, 22(i)(c) and 33)

-9.10.98

R 00290

PATENT APPLICATION NO.

A &amp; A REF: V13050 AL

21 01

59244

LODGING DATE

INKOMSTE  
REPUBLICAN SOUTH AFRICA  
HASR 370

FULL NAME(S) OF APPLICANT(S)

71

ANGLO AMERICAN INDUSTRIAL CORPORATION LIMITED

FULL NAME(S) OF INVENTOR(S)

72

ADRIAAN RETIEF SWANEPOEL



EARLIEST PRIORITY CLAIMED

COUNTRY

NUMBER

DATE

33 NIL

31 NIL

32 NIL

NOTE: The country must be indicated by its International Abbreviation - see schedule 4 of the Regulations

TITLE OF INVENTION

54

"A WINDSCREEN WIPER"

I/We &gt; MICHAEL JOHN NAYLER AND CAIN LESLIE FARREL

hereby declare that :-

1. ~~I/We am/are the applicant(s) mentioned above;~~
2. I/We have been authorized by the applicant(s) to make this declaration and have knowledge of the facts herein stated in the capacity of DIRECTOR & NOMINEE OF SECRETARIES of the applicant(s);
3. the inventor(s) of the abovementioned invention is/are the person(s) named above and the applicant(s) has/have acquired the right to apply by virtue of an assignment from the inventor(s);
4. to the best of my/our knowledge and belief, if a patent is granted on the application, there will be no lawful ground for the revocation of the patent;
5. ~~this is a convention application and the earliest application from which priority is claimed as set out above is the first application in a convention country in respect of the invention claimed in any of the claims; and~~
6. the partners and qualified staff of the firm of ADAMS & ADAMS, patent attorneys, are authorised, jointly and severally, with powers of substitution and revocation, to represent the applicant(s) in this application and to be the address for service of the applicant(s) while the application is pending and after a patent has been granted on the application.

SIGNED AT JOHANNESBURG  
ANGLO AMERICAN CORPORATION  
OF SOUTH AFRICA LIMITED  
Secretaries

THIS &gt; 10TH DAY OF FEBRUARY

19 98

*[Signature]*  
DIRECTOR SIGNATURE(S)  
(no legalization necessary)

Per .....  
Senior Divisional Secretary

For and  
On behalf of:  
ANGLO AMERICAN INDUSTRIAL CORPORATION LIMITED

In the case of application in the name of a company, partnership or firm, give full names of signatory/signatories, delete paragraph 1, and enter capacity of each signatory in paragraph 2.

If the applicant is a natural person, delete paragraph 2.

ADAMS & ADAMS  
PATENT ATTORNEYS  
PRETORIA

REPUBLIC OF SOUTH AFRICA  
Patents Act, 1978

# PROVISIONAL SPECIFICATION

(Section 30 (1) - Regulation 27)

OFFICIAL APPLICATION NO.

21 01

989244

LODGING DATE

22 9 October 1998

FULL NAMES(S) OF APPLICANT(S)

71

~~ANGLO AMERICAN INDUSTRIAL CORPORATION LIMITED~~  
TRICO PRODUCTS CORPORATION

AANSOEKERS VERVANG  
APPLICANTS SUBSTITUTED  
19/5/99

FULL NAME(S) OF INVENTOR(S)

72

ADRIAAN RETIEF SWANEPOEL

TITLE OF INVENTION

54

"A WINDSCREEN WIPER"

This invention relates to a windscreen wiper, which is also known as a windshield wiper.

The invention relates in particular to a windscreen wiper which has a curved backbone and which may have a varying width and/or thickness. It will be appreciated by those skilled in the art that the backbone may be in the form of a beam that is curved in a plane or may have compound curvature. The beam will then usually have width and thickness dimensions. The beam will also have a radius of curvature at each point along its length.

When such a windscreen wiper is pressed onto a surface such as the windscreen (or windshield) of a vehicle, the force intensity (the force per unit length) will vary at different positions along the length of the beam. A large number of factors affect the manner in which the force intensity distribution varies, such as:

the material from which the beam is made and the Young's modulus thereof;

the length of the beam;

curvature of the beam;

curvature of the surface;

variation in any one or both of the width of the beam and the

---

thickness of the beam;

the magnitude of the force applied to the beam; and

the position, or positions, at which the force is applied.

The applicant has found that, with shorter beams, it is adequate to apply the force at a single point. However, with longer beams, ie beams that are longer than about 400mm it is preferable to apply the force to the beam at two spaced apart points. The applicant has further found that the degree of variation of force intensity resulting from changes in curvature of the surface and the magnitude of the force applied to the beam, in use, varies significantly depending on the spacing between the points of application of the force and the ratio between the spacing distance and the total length of the beam.

The applicant has further found that if the spacing between the points exceeds a certain limit, the windscreen wiper will not operate in an efficient manner. There are two main factors which should be taken into account when determining the upper bound of the spacing between the points. Firstly, the vertical clearance between the beam and a force applying member should be taken in to account, when changing from straight to free form in use. Secondly, longitudinal movement of the beam between the force application points should also be considered, when the beam changes from straight to free form.

The applicant has conducted substantial analysis in this regard and believes that it has found a relationship between the spacing distance and the total length of the beam and, consequently, between the ratio of spacing distance to total length and length, which provides a windscreen wiper that operates in an improved

manner.

According to a first aspect of the invention there is provided a windscreen wiper which includes

5 an elongate curved backbone which is of a resiliently flexible material,; and  
a force applying member which is connected to the backbone at two spaced  
apart points

with the spacing distance  $S$  (expressed in millimetres) between the points  
being between

10  $S_1 = 0.1 * L \dots\dots\dots$  (1)

and

$S_2 = 0.35 * L \dots\dots\dots$  (2)

where the length  $L$  is the total length of the backbone expressed in millimetres.

15 Further according to a second aspect of the invention there is provided a  
windscreen wiper which includes

an elongate curved backbone which is of a resiliently flexible material; and  
a force applying member which is connected to the backbone at two spaced  
apart points

20 with the ratio  $R$  of spacing distance  $S$  between the points and the total  
length  $L$  ( $R = S/L$ ) being between

---

$R_1 = 0.1 \dots\dots\dots$  (3)

and



$$R_2 = 0.35 \dots\dots\dots (4)$$

where the total length L is expressed in millimetres.

5        The preferred spacing distance  $S_p$  between the spaced apart points is about

$$S_p = 0.363 * L - 0.000146 * L^2 \dots\dots\dots (5)$$

and the preferred ratio  $R_p$  is about

$$R_p = 0.363 - 0.000146 * L \dots\dots\dots (6)$$

10

The force applying member may be connected to the backbone in such a manner as to permit relative longitudinal displacement between the force applying member and the backbone.

15

The curved backbone may have a varying width and or thickness, along its length. The backbone may further have a free form curvature in a plane or may have a compound curvature.

20

It will be appreciated that the force applying member normally straddles the geometric centre of the backbone. This is particularly so for a windscreen wiper that is intended for use on a driver's side. However, the force applying member may be positioned off-centre, for certain cases such as, on passenger side windscreens. In that way the overall performance of the wiper may be optimised.

The invention is now described, by way of example with reference to the accompanying drawing, which shows schematically a windscreen wiper in accordance with the invention.

5           The windscreen wiper 10 includes a backbone 12 which is in the form of a beam. The beam is made from spring steel having a Young's modulus of 205GPa. The length of the beam is 700mm. The beam tapers both in width and thickness from its centre toward its free ends or tips as shown in Graph A and Graph B respectively. Graph A illustrates the beam thickness (in millimetres) at various  
10 positions along the length of the beam, which is also measured in millimetres. Graph B illustrates the width of the beam (in millimetres) at various positions along the length of the beam which is also measured in millimetres.

          The beam is curved longitudinally, in a plane, with a predetermined radius  
15 of curvature at every point along its length Graph C shows the beam centre line ordinate relative to the position along the length of the beam (in millimetres).

          A force applying member 14 is connected to the beam 12 at two spaced apart points 16 and 18, with a spacing distance S between the points. At the  
20 point 16, the force applying member 14 is connected to the beam 12 by means of a pin 20 which is pivotally located in a complementary hole in the beam 12 which does not permit relative longitudinal movement between the beam 12 and the force  
applying member 14. At the other point 18, the force applying member 14 is connected to the beam 12 by means of a pin 22 which is received in a longitudinal

slot 24 in the beam 12 so that relative longitudinal and pivotal movement between the pin 22 and beam 12 is permitted.

It will be appreciated that there needs to be clearance between the force  
5 applying member 14 and a line between the points 16 and 18, indicated at 26, in which the section of the beam 12 between the points 16 and 18 can move when the beam changes shape from curved to straight and vice-versa.

Graph D illustrates the clearance 26 required for the beam 12 described  
10 above as a function of spacing distance S and Graph E illustrates the amount of longitudinal movement between the beam 12 and the pin 22 when the beam 12 changes shape from curved to straight and vice-versa.

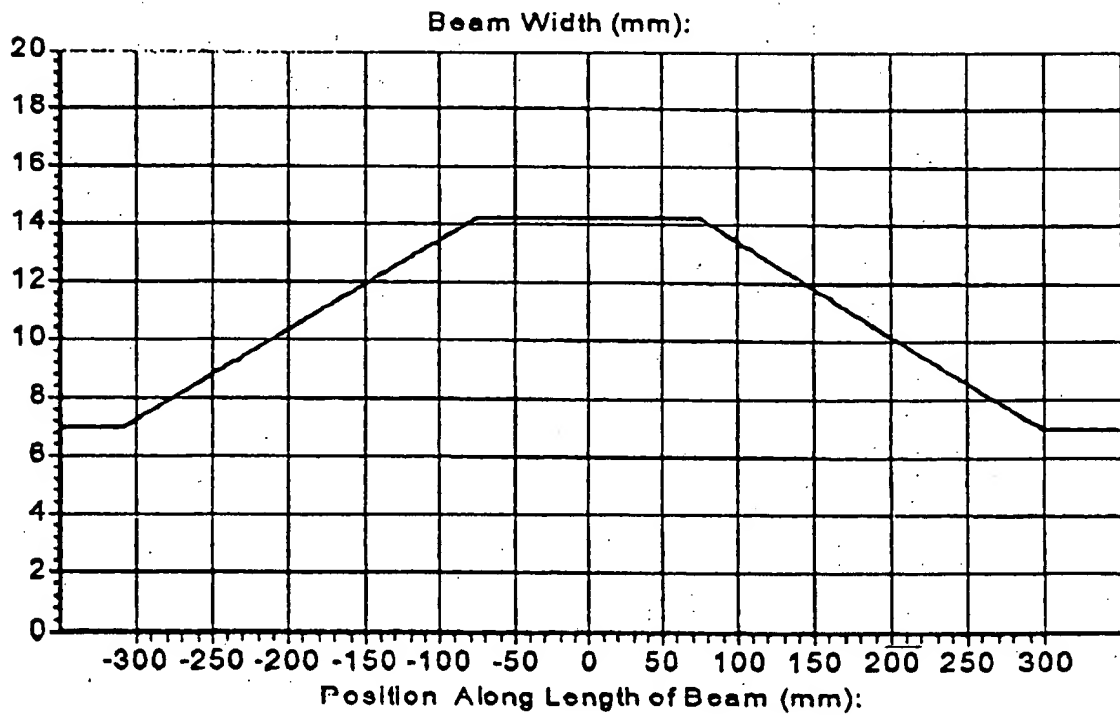
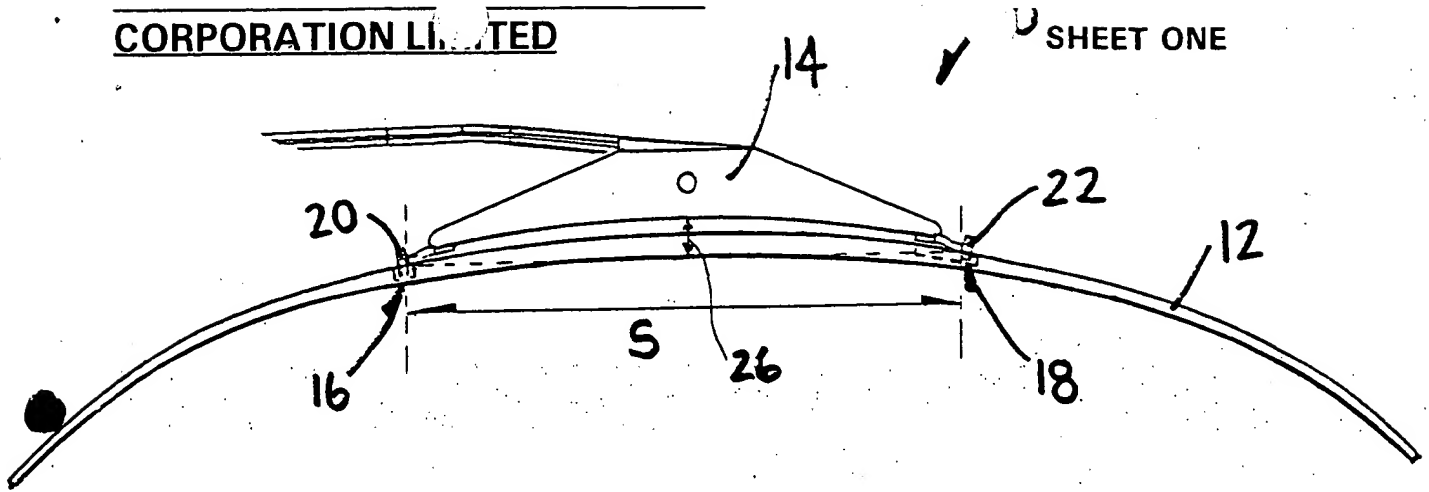
The spacing S is 150mm. In this case, the ratio R of spacing distance S  
15 between the points 16 and 18 and the total length L ( $R = S/L$ ) is therefore 0,214.

20 DATED THIS 9TH DAY OF OCTOBER 1998

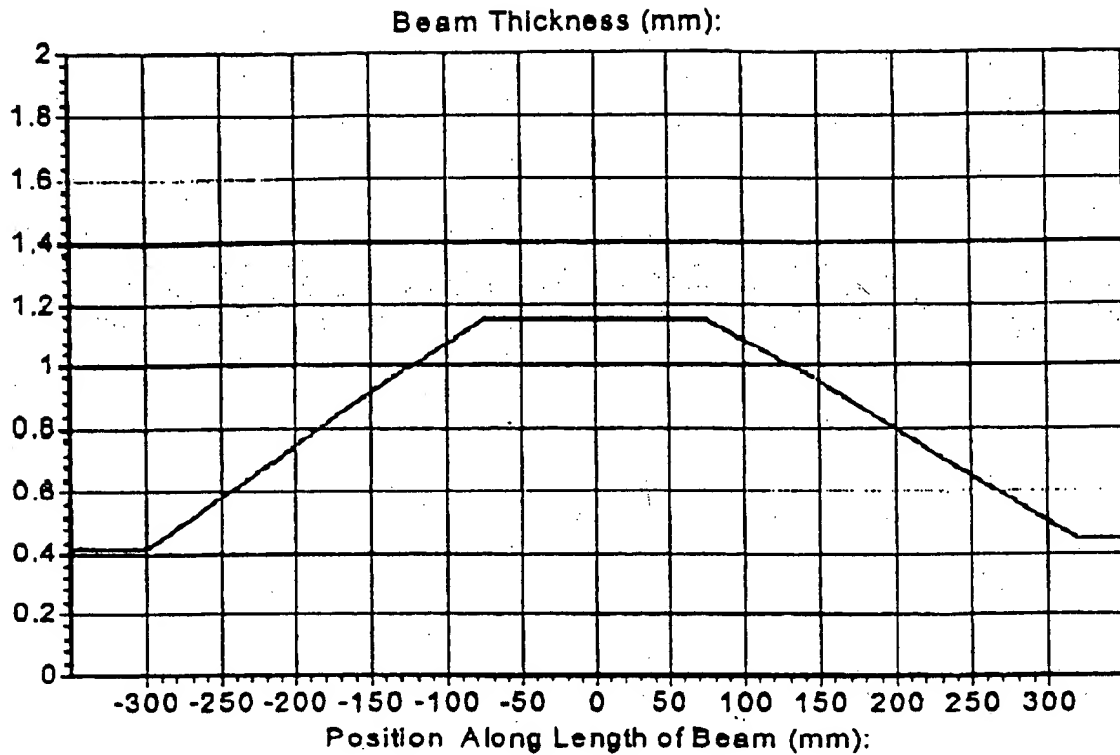


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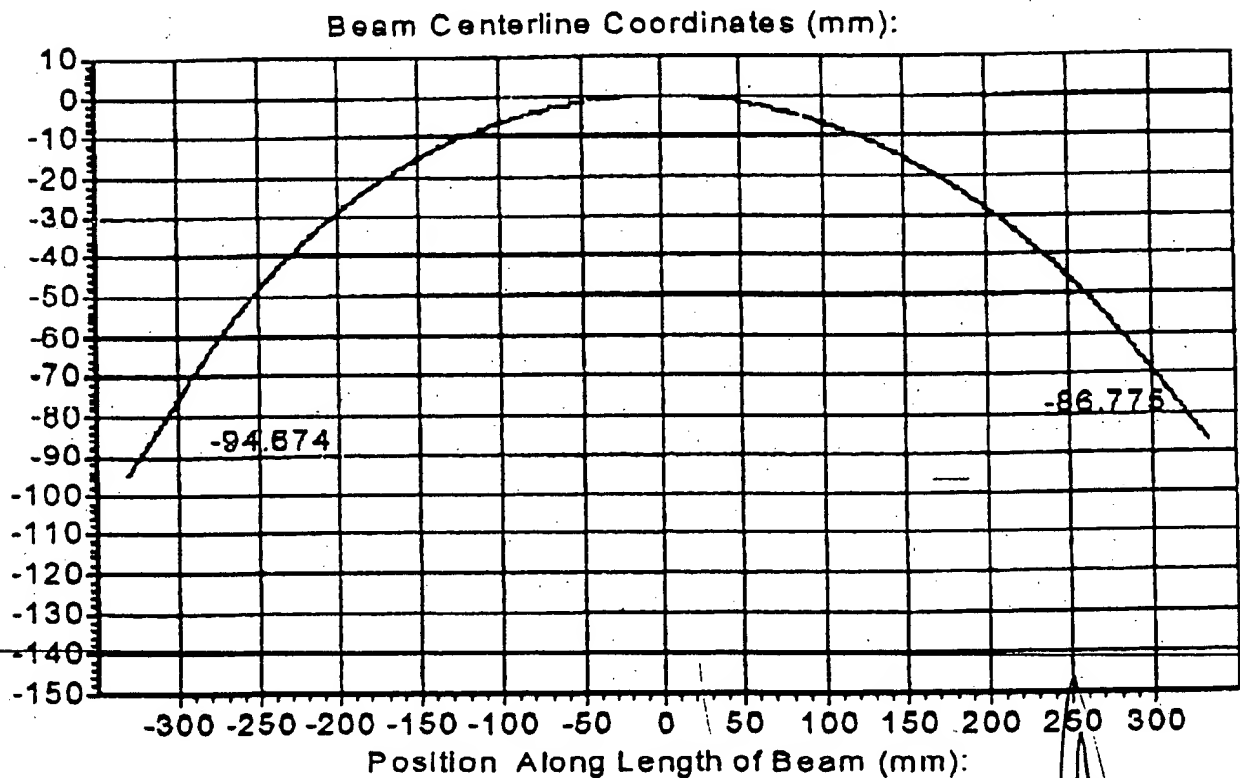
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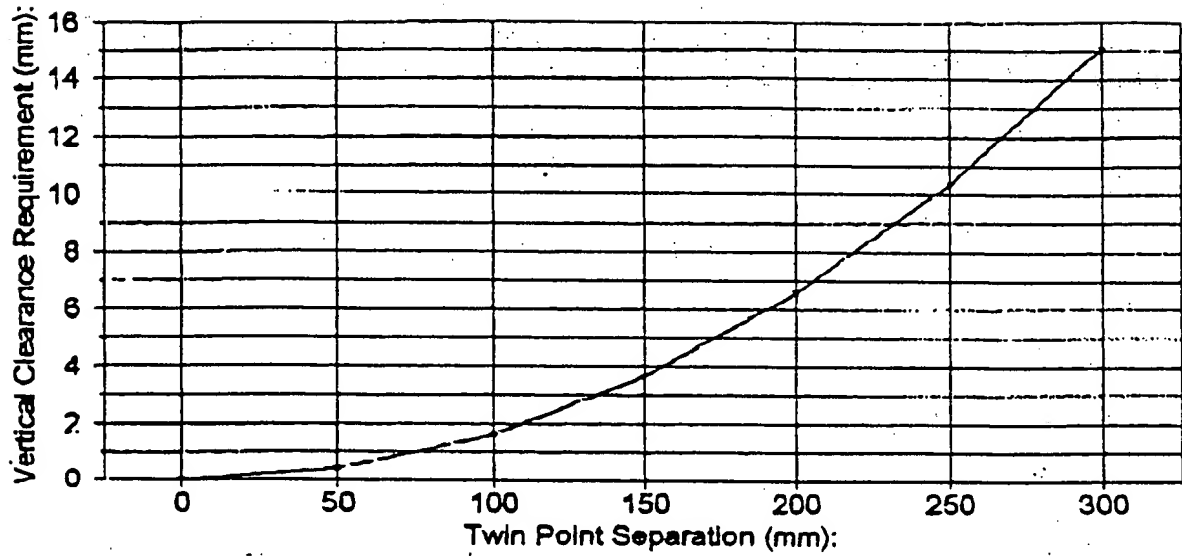
Graph A



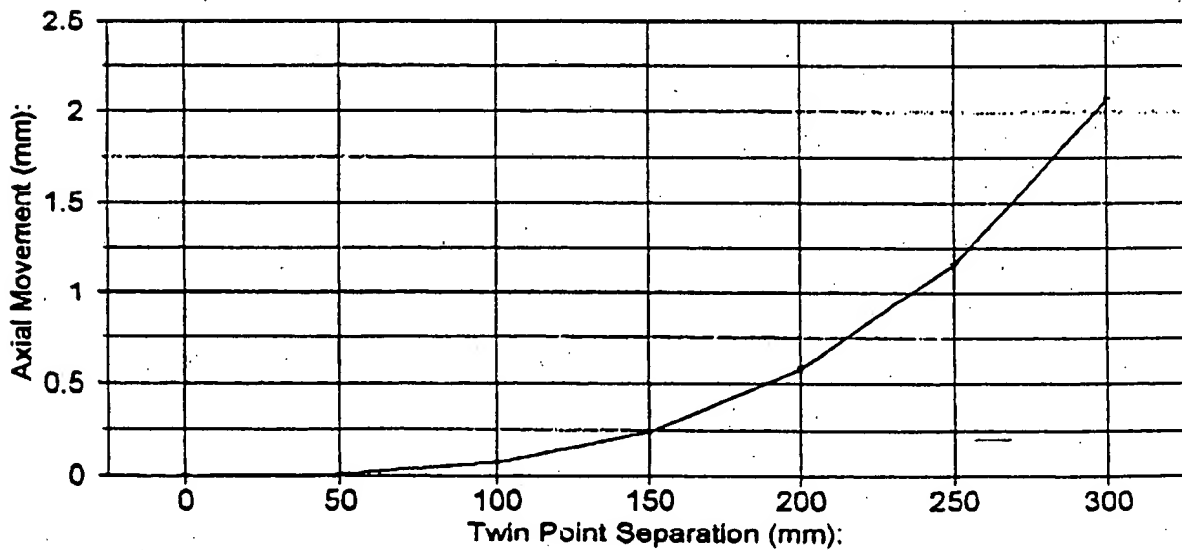
Graph B



Graph C



Graph D



Graph E